Pursuant to 37 C.F.R. §1.121, "one or more pages separate from the amendment, marked up to show all of the changes relative" to the previous versions of the paragraphs and claims are provided in Appendix A attached herewith.

REMARKS

Claims 1 - 19 are pending and under consideration.

In the Office Action of June 5, 2002, claims 1 - 19 were rejected. The Examiner alleged that all pending claims are unpatentable over Watanabe et al.[1] in view of Allen et al.[2] under §103(a)[3].

Applicants have amended the independent claims, i.e. claims 1, 7, 10 and 17, to include the limitations of performing a transform and quantization for encoding, or performing an inverse transform and inverse quantization for decoding. Further, these claims also include the limitation of waiting for the end of variable length coding/decoding of a data block when the variable length coding/decoding of a previous data block is not yet complete. The combination of all of these features, including the predictive coding/decoding and the [inverse] transform with [inverse] quantization, is not taught by Watanabe et al. and Allen et al., either individually or combined. Therefore, Applicants respectfully submit that the independent claims are believed patentable over both of these references.

Pending claims 2 - 6, 8 - 9, 11 - 16 and 18 - 19 are dependent claims. Because the independent claims are patentable over the cited references as discussed above, these dependent claims are likewise patentable over these references because they incorporate the limitations of their respective parent independent claim.

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[1] U.S. Pat. No. 5,675,331.
[2] U.S. Pat. No. 5,583,500.
[3] 35 U.S.C. §103(a).

CONCLUSION

In view of the foregoing, it is submitted that pending claims 1 – 19 are patentable over the cited references. Further, all of the Examiner's objections and rejections have been addressed herein. It is, therefore, submitted that the application is in condition for allowance.

Notice to that effect is respectfully requested.

Respectfully submitted,
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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited as First Class Mail with the United States Postal Service with sufficient postage in an envelope addressed to: BOX RCE, Commissioner for Patents, Washington, D.C. 20231 on August 1, 2002.

Rose M. Garza Date: August 1, 2002

8-1-02

APPENDIX A

The following are marked-up versions of the amended claims:

1. (Three times amended) An encoding apparatus for producing encoded data blocks, ~~the encoding apparatus comprising a multiprocessor system comprising:~~

~~a plurality of signal processing devices connected by a signal transfer means on which said data blocks are transferred,~~ wherein

each of said data ~~block~~ blocks is one of a macroblock or a slice,

and wherein a first assigned data block assigned to a first ~~processing device in the plurality of processing devices~~ process is produced in parallel with a second assigned data block assigned to a second ~~processing device in the plurality of processing devices~~ process,

and wherein the first ~~processing device~~ process and the second ~~processing device~~ process respectively include at least: ~~a fixed length coding means for producing fixed length coded data and a variable length coding means for subsequently variable length coding the fixed length coded data as steps in producing the coded data blocks~~

encoding means for performing a predetermined transform with respect to predicted error or pixel value of the assigned data block and quantization with respect to a predetermined transform coefficient generated in said predetermined transform, and

variable length coding means for performing variable length coding with respect to the result of said quantization

to produce said encoded data blocks,

and wherein end of variable length coding of a data block is awaited when the variable length coding of a previous data block has not yet ended.

2. (Twice amended) An encoding apparatus as set forth in claim 1, wherein ~~each of~~ said variable length coding means ~~of said plurality of signal processing devices~~ detects completion of the variable length coding of a current data block and starts variable length coding of a subsequent data block.

3. (Three times amended) An encoding apparatus as set forth in claim 2, ~~wherein~~ further comprising:

~~each of said~~ a fixed length encoding means ~~of said plurality of signal processing devices carries out said~~ for performing fixed length encoding for each ~~image~~ slice data block comprising an image slice, and wherein

~~each of~~ said variable length coding means ~~of said plurality of signal processing devices carries out~~ performs variable length coding on each ~~image~~ slice data block.

4. (Twice amended) An encoding apparatus as set forth in claim 3, wherein

~~each of~~ said fixed length encoding means ~~of said plurality of signal processing devices~~ comprises~~;~~:

a motion compensation predicting means for selectively carrying out motion compensation prediction by referring to a reference image,

a transform means for carrying out a predetermined transform with respect to pixel data of a result of said motion compensation prediction or with respect to original pixel data to provide transformed block data, and

a quantizing means for quantizing the transformed block data to provide quantized block data, and

a local decoding means for decoding the transformed block data to generate the reference image to be supplied to said motion compensation predicting means, and wherein

~~each of~~ said variable length coding means ~~of said plurality of signal processing devices~~ carries out variable length coding on the quantized block data.

6. (Twice amended) An encoding apparatus as set forth in claim 4, wherein ~~the~~ said predetermined transform is any of a discrete cosine transform ~~(DCT)~~, a Fourier transform, a Hadamard transform, and a K-L transform.

7. (Three times amended) An encoding method for encoding a data stream, the method comprising:

dividing said data stream into a plurality of data blocks, each data block comprising one of a macroblock and ~~an image~~ a slice;

~~successively allotting said data blocks to individually assigned signal processing devices in a plurality of signal processing devices;~~

encoding said data blocks in parallel ~~in each of said individually assigned signal processing devices~~ to produce encoded data blocks by performing s predetermined transform

with respect to predicted error or pixel value of the assigned data block and quantization with respect to a predetermined transform coefficient generated in said predetermined transform;

successively carrying out variable length coding for the encoded data blocks ~~in its individually allotted signal processing device~~ with respect to the result of said quantization; and

successively allotting additional data blocks ~~to the signal processing devices~~ that have completed variable length coding; wherein

end of variable length coding of a data block is awaited when the variable length coding of a previous data block has not yet ended.

8. (Twice amended) An encoding method as set forth in claim 7, ~~wherein each of said plurality of signal processing devices~~ further comprising ~~detects~~ detecting when variable length coding for a current data block has been completed and ~~begins~~ beginning variable length coding of a subsequent data block.

9. (Twice amended) An encoding method as set forth in claim 8, wherein

said data stream comprises image data,

and further comprising: ~~the steps of, in each of said plurality of signal processing devices,~~

performing motion compensation prediction for said data blocks by referring to a reference image to generate compensated data blocks;

performing a predetermined transformation on the compensated data blocks to generate transformed data blocks;

quantizing the transformed data blocks to generate quantized data blocks; and

obtaining the reference image from at least one of the quantized data blocks.

10. (Three times amended) A decoding apparatus for decoding a data stream comprising a plurality of data blocks, the decoding apparatus comprising:

a ~~multiprocessor~~ system comprising a ~~plurality of~~ signal processing ~~devices~~ device, wherein

each data block comprises a macroblock or a slice,

and wherein a first assigned data block ~~assigned to a first processing device in the plurality of processing devices~~ is decoded in parallel with a second assigned data block ~~assigned to a second processing device in the plurality of processing devices~~,

and wherein the ~~first~~ processing device ~~and the second processing device include~~ includes at least: ~~a fixed length decoding means for producing fixed length coded data and a variable length decoding means for subsequently variable length coding the fixed length coded data as steps in decoding the coded data blocks.~~

variable length decoding means for performing variable decoding with respect to encoded data of the assigned data block, and

decoding means for performing an inverse quantization with respect to the result of said variable length decoding and an inverse predetermined transform with respect to the result of said inverse quantization,

to produce said decoded data blocks, and wherein

end of variable length decoding of a data block is awaited when the variable length decoding of a previous data block has not yet ended.

11. (Three times amended) A decoding apparatus as set forth in claim 10, wherein ~~each of~~ said variable length decoding means ~~of said plurality of signal processing devices~~ detects completion of the variable length decoding of a current data block and starts variable length decoding of a subsequent data block.

12. (Three times amended) A decoding apparatus as set forth in claim 11, further comprising an allotting means for sequentially allotting the data blocks to said ~~plurality of~~ signal processing ~~devices~~ device, and

wherein ~~each of~~ the signal processing ~~devices~~ device performs both the variable length decoding and the fixed length decoding of each data block ~~allotted to it~~.

13. (Three times amended) A decoding apparatus as set forth in claim 11, wherein

said data stream is a variable length coded image data stream obtained by fixed length and variable length encoding of image data blocks and wherein ~~each of~~ the signal processing ~~devices~~ device performs both the variable length decoding and the fixed length decoding of each data block ~~allotted to it~~.

14. (Twice amended) A decoding apparatus as set forth in claim 13, wherein

~~each of~~ said decoding means of said ~~plurality of~~ signal processing ~~devices~~ device comprises

an inverse quantizing means for inverse quantizing variable length decoded data blocks to obtain inverse quantized data blocks,

an inverse transform means for carrying out an inverse transform on said inverse quantized data blocks to obtain inverse transformed data blocks,

an image data generating means for generating original image data by referring to a reference image, and

a motion compensation processing means for carrying out motion compensation processing based on at least one of the inverse transformed data blocks and said image data blocks to generate said reference image.

16. (Twice amended) A decoding apparatus as set forth in claim 14, wherein said inverse transform is one of a discrete cosine transform ~~(DCT)~~, Fourier transform, Hadamard transform, and K-L transform.

17. (Three times amended) A decoding method for decoding a data stream comprising a plurality of data blocks, the method comprising:

~~successively allotting data blocks to a plurality of signal processing devices;~~

wherein each data block is one of a macroblock or a slice~~;~~,

in ~~each~~ said signal processing device, carrying out both variable length decoding on ~~an assigned~~ data ~~block~~ blocks followed by fixed length decoding of ~~said assigned~~ the data blocks,

wherein the signal processing ~~devices perform~~ device performs the variable length decoding and fixed length decoding of ~~assigned~~ data blocks in parallel, and wherein

said variable length decoding and fixed length decoding comprise:

variable length decoding with respect to encoded data of a data block, and

inverse quantization to produce quantized data blocks, and

decoding by performing an inverse quantization with respect to the result of said variable length decoding and an inverse predetermined transform with respect to the result of said inverse quantization

to produce decoded data blocks, and wherein

end of decoding of a data block is awaited when the decoding of a previous data block has not yet ended.

18. (Three times amended) A decoding method as set forth in claim 17, wherein ~~each of~~ said ~~plurality of~~ signal processing ~~devices~~ device detects when variable length decoding for a current data block has been completed and begins variable length decoding of a subsequent data block.

19. (Three times amended) A decoding method as set forth in claim 18, wherein

said data stream comprises a plurality of image data blocks,

and further comprising ~~the steps of~~, in ~~each of~~ said ~~plurality of~~ signal processing ~~devices~~ device,

inverse quantizing the image data blocks to generate quantized data blocks;

performing an inverse transformation on the quantized data blocks to generate transformed data blocks;

obtaining original image data from at least one of the transformed data blocks; and

performing motion compensation processing for said transformed data blocks.